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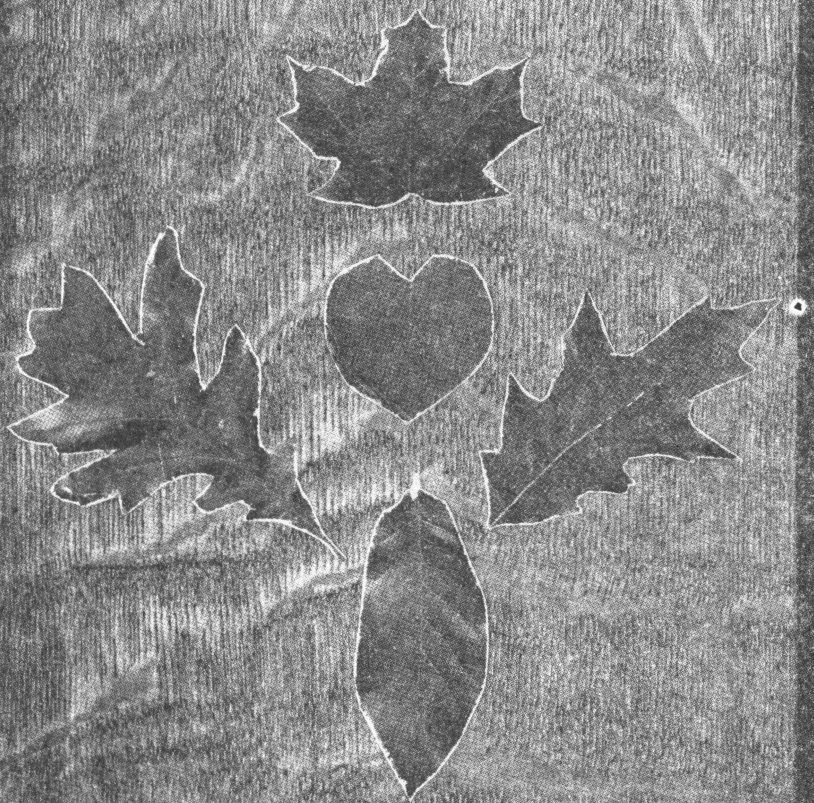
The Suitability of NATIVE WOODS for FARM USE



Foreword

Wasteful consumption and faulty cutting practices have made it necessary for many to search in the home woodlands for a satisfactory and lower cost timber supply.

This publication is a study of farm wood requirements and the qualities of practically all timber, especially the more abundant hardwoods, now growing on farms and ranches in Texas. It is written to help farmers and ranchmen select suitable woods and trees for common uses and for forest and land use management. It does not deal adequately with other important farm woodland vegetation and resources, such as forage, food, water, wind and erosion protection, recreation and wildlife.

Other bulletins in this series will include: "Equipment for Cutting and Logging Farm Timber", "Farm Sawmills", "Tree and Log Scale Cards", "Fence Post and Other Wood Treatments for the Farm", and others. These bulletins will be available for free distribution by the Extension Service, College Station, Texas or by your county agricultural agent.

THE COVER:

Quarter-sawed white oak used to make this panel shows wood's natural qualities applied usefully and artfully.

Issued by
The Extension Service
Agricultural and Mechanical College of Texas and
The United States Department of Agriculture
Ide P. Trotter, Director, College Station, Texas

The Suitability of Native Woods for Farm Use

By
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Wood, one of the more adaptable raw materials, is easy to use and as a resource can be renewed. The best and easiest woods to use have become scarce and expensive. Substitute materials may help to make up deficiencies in the future, but never enough. The value of the farm and farmer in forestry was not well recognized until the scarcity of basic wood materials from the commercial forests became apparent in recent years. Nothing responds better to man's careful handling than forest resources, which should be made to give farmers more profits and satisfactory, diversified uses, and employment opportunities.

It is not good business to sacrifice first rate timber on a market which is obviously too low, nor is it wise or businesslike to convert standing trees of fair promise for high class use into crude forms of forest products. Suitable types of small mills and machinery, along with proper logging equipment, simple methods of preservative treating of wood and sensible methods of cutting, fair scale and sale of timber, will enable the conversion of much good farm timber into desirable materials for farm building, farm operation and for the market.

Kind and Amount of Timber Available on Farms and Ranches

Approximately ⅓ of the farmers and ranchers of Texas, according to the 1940 census, own about 14,000,000 acres of timber, suitable for lumber making and other uses, averaging about 100 acres per farm. Texas has about 45 million acres of scrubby mesquite-brush type, exclusive of about 3 million acres of cedar brakes which supply most of our commercial post woods.

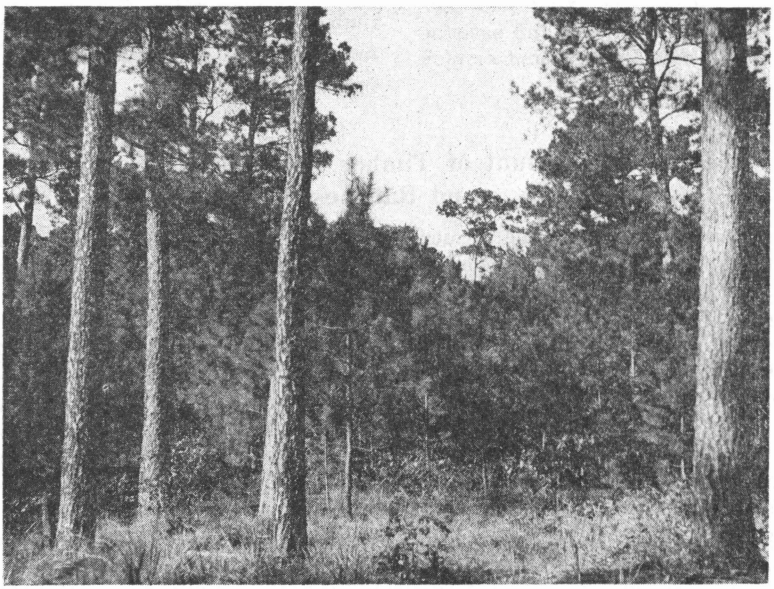
The total of the saw timber size trees suitable for farm use on the 14,000,000 acres (trees having at least one log 8 inches in diameter or larger and 8 feet or more in length) has been roughly estimated to be about 15 to 20 billion board feet. The annual growth of farm sawtimber may be approximately one billion board feet. The cut of pines exceeds the growth, and the growth of most hardwoods exceeds the cut.

Texas pine and hardwood sawtimber lands also have millions of cords of smaller trees suitable for fence posts if treated with preservatives; fuel and other uses in

development. There is an abundance of pulping hardwoods which are invading the pine forests but only a small amount is used. Timber surveys should be made periodically because of the changes in species, growth, drain, utilization, requirements and ownership. Farmers can appraise their own timber resources using the tree and log scale cards furnished by the Extension Service.

The total sawtimber volume on farms and ranches in the state suitable for most farm and many local uses is estimated, according to species from more than 100 well distributed sample plots, as follows: pines, probably not to exceed 30%; post oak 25% or more; red oaks 10%; elms 7%; sweet gum 5%; live oak 4%; other white oaks 4%; hackberry 3%; black gum 2%; ash 2%; hickory 1%; pecan 1% and about 30 other species which make up the remainder, approximately 6%. About 33% of the pines and 90% of the hardwoods are produced on the farms and ranches.

The pines and hardwoods are 90% second growth (immature) or small for other reasons, principally poor sites, deficiencies of moisture, soil, etc. On the average, this timber has short lengths of stem clear of limbs but very sound and strong and many hardwoods have durable heartwood. The average size of the second growth pine saw-timber tree, 8 inches and larger in diameter, is now about 12 inches at the stump. It has a merchantable length of about 1½ sixteen-foot logs and will saw out about 60 board feet of lumber. The



A properly managed pine forest in East Texas. It has pure stands of pines growing in small even-aged groups.

average size hardwood tree in the post oak-hardwood regions suitable for farm lumber making has a clear log averaging 10 feet long and 10 inches in diameter inside bark at the small end and will cut about 35 board feet. The minimum log size in this estimate scales 15 board feet. Some trees in unfavorable areas never will reach large sizes and may be the only trees of any quantity available for sawtimber. Some good sawtimber, principally cottonwood, occurs naturally along the drainages farther west but more young trees must be established for future cutting. The practicability of utilizing the short stems but durable wood of mesquite with bolters or small mills for making small dimension for strips, furniture, shingles, window sash and wagon felloes, has not been tried sufficiently. Some of the millions of slow growth "switch top" pine trees which are too small for pulpwood and logs should be thinned from crowded stands before they become too suppressed and die, and can be sawed into small dimension, fuelwood or treated for small fence posts.

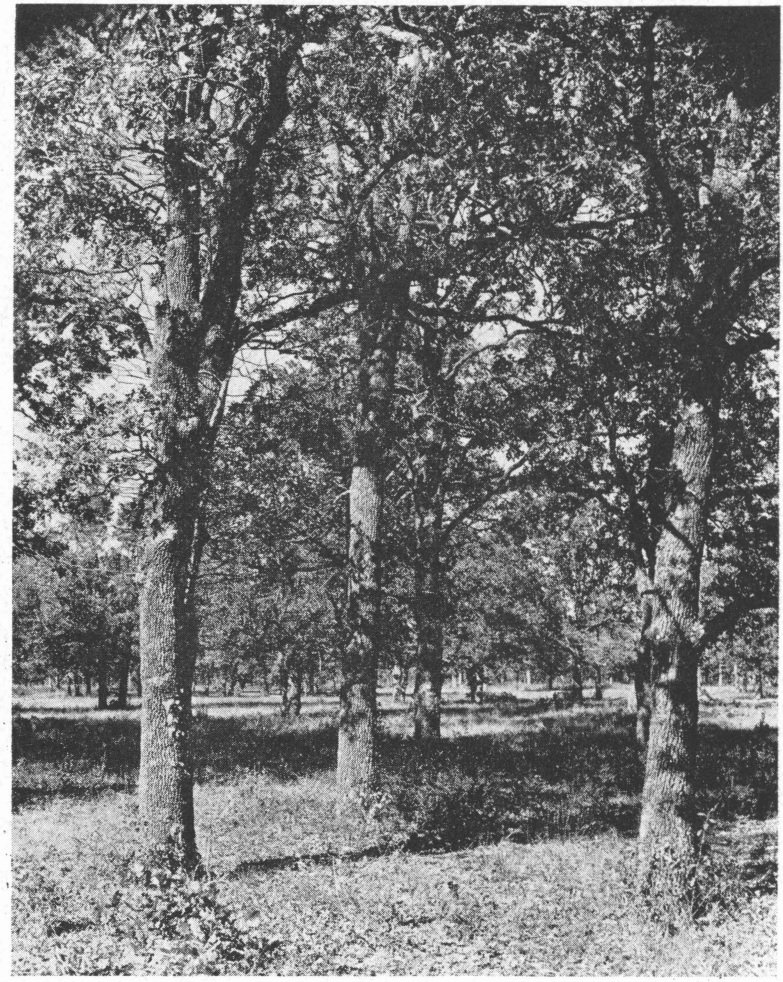
In the pine-hardwood forest types of East Texas the volume of sawtimber is decreasing and averages about 2,000 board feet per acre. About half of it is hardwood. In the post oak-hardwood regions of central Texas, a scrub type compared to the original East Texas forest, the volume of farm sawtimber averages 1200 board feet per acre with almost half of it post oak. There remains some areas of more valuable forests than these figures show and such forests are an inspiration to timber farmers and nature lovers.

Grow and Harvest Better Timber

Better woods for the farm can be developed if we give more consideration to the requirements of both trees and farms. Mature trees which are tolerant of shade, like the gums, should be cut selectively for reforesting and light yearly harvests; but trees intolerant of shade, like the pines, grow better in even aged groups and should be clear cut by openings large enough for pure type reforesting from seed blown from the bordering stands. The area of a pine forest which can be clear cut each year may be determined roughly by dividing the total acres of forest by the age of profitable stands grown there.

The immature stands of trees, both tolerant and intolerant species, should be thinned often, and, if limby should be pruned to grow stems clear of knots. Well distributed thrifty growth trees of good promise should always be favored. All sizes of trees of low value should be cut and used if possible, and worthless "weed" trees or brush which will not develop into useful timber should be deadened or reduced to low interference. Suitable trees may be planted or sometimes seeded where good ones will not reforest naturally. Farm and ranch woodlands and some areas not in forest may be improved and managed to produce timber and other resources. Improvement cuttings (thinning and pruning

and cutting or deadening undesirables) will improve the growth and quality of both timber and range resources of the forest. Improvement cuttings with grazing by suitable kinds of livestock are practical ways for holding fires and worthless vegetation in check.



Here are shown postoak, hardwoods of Central Texas. More wood uses should be developed.

Wood Required for Farms and Ranches

To obtain the most uses and the best markets for farm timber it should first be made into lumber. The average length of lumber or other shaped timber used on the farm is about 8 feet. Approximately 80% to 90% of the farm buildings and urban homes are built of lumber. Some of the pickup things on the farm, such as tool handles, containers, vehicles, implement and machine parts, wooden wares, instruments, furniture and fixtures, are made in large part from lumber. More than half of the timber harvest is for lumber of which about half is used in the rural areas.

Next in importance to lumber is fuel wood, which largely is produced and consumed on the farm. About 20% of the total timber cut is used for heating and generating power. Fence posts, cross ties and pulpwood compete for third place, each requiring 5% to 8% of the total harvest. Veneer and plywood, cooperage, poles and piling, foods, medicines, textiles, plastics, and chemicals from wood make up the remainder—some of which require from 1% to 3% of the yearly cut.

Roughly estimated, the yearly requirements of some wood products for Texas farms and ranches probably do not exceed one-half billion feet of lumber and lumber products, nor over three million cords of fuelwood and around 75,000,000 fence posts.

Some Important Properties and Qualities of Woods Required for Farm Use

The following discussions on various properties and characteristics are important in classifying and selecting woods for many farm uses. The information is obtained largely from publications by the U. S. Forest Products Laboratory, Madison, Wisconsin. Processes are being developed for the purpose of improving the native woods.

Weight—A heavy piece of dry wood is stronger, as a rule, than a lighter one. Weight is a reliable index of the strength properties of dry woods.

Hardness—Hardness resists wear, denting and cutting, crushes less under load and polishes best. The hardest woods are difficult to nail or cut with tools and are more likely to split in nailing and require more suitable methods of fastening and joining. Flooring, furniture, and tool handles require hardness.

Toughness—This property resists suddenly applied loads, shock and blows such as are given ax handles, axles, spokes, and tongues and, as a rule, require hardwoods such as hickory, pecan and ash. Tough woods give some warning of over-loading.

Stiffness — Stiffness measures the resistance to bending under a load. It is an important property in floor joists, shelving, beams and some handles.

Bending Strength—Strength is a measure of load-carrying capac-

ity for such uses as barn rafters and joists, heavy loaded floor girders, bridge stringers, vehicle tongues, single and double-trees and scaffold platforms.

An increase in height of a beam effectively increases its bending strength. The size of a beam, joist, girder or stringer for use on the farm may be determined roughly by the following rule of thumb. The distance between the supporting posts in feet should not be greater than the height of the girder, or other member, in inches and if strong wood materials are not available or practical to use, either larger sizes or more pieces with less strength can be used.

Strength as a Post—This property measures the load capacity in the direction of the length (axis) for such uses as supports for barns, sheds, cellars, and bridges and for these uses a durable wood must be selected or non-durable wood treated to resist decay and insects. Unbraced slender supports should be judged by their stiffness as well.

Freedom from Shrinkage and Swelling—Wood shrinkage in drying and swelling as moisture is absorbed can be avoided to some extent by using wood dried to the right moisture content. Shrinking and swelling in the width of a flat-grained board is nearly twice that of an edge-grained (comb-grained) board of the same width. Much of the shrinkage troubles where lumber is used in ordinary construction is avoided by thorough air seasoning and more in thorough kiln-drying. Wood is also being treated with chemicals, heat and pressure

Cedar, hardwoods of Central Texas, are scrubby. Much clearing is needed.

to make it remain stable in dimension and strength.

Freedom from Warping—Warping is closely allied with shrinkage. Cross-grained wood or lumber cut through the crook of logs tends to warp when it shrinks. Straighter logs can be produced in various lengths by sawing them off at the crooks in the tree. Warping and cupping are also reduced to a minimum by the use of quarter-sawed (edge-grained) dry material and by cutting stock to squares or near squares such as 2 x 4's from the smallest logs, center of logs and pine logs with less than four annual rings per inch. Proper piling and drying of lumber is very important and painting or varnishing dry wood that is exposed in construction will reduce warping.

Nail-holding, Nailing and Splitting—Nail-holding is closely related to hardness. If the diameter of the nail is doubled the holding power is doubled. Cement covered and pitted nails hold best. Driven into wet, green wood, which is easy, nails lose about three-fourths of their holding power when the wood dries. Barbed nails are best in holding green wood. Nails may also be driven part way into green wood and driven home when it is dry. Heavy, hard or non-uniform textured dry woods split more in nailing than light weight woods. To reduce splitting use smaller nails and more of them. Round nails with points clipped off, narrow oval-shaped and old-fashioned cut nails split wood less than sharp pointed nails. Nails can be driven into hardwood somewhat easier after they have been stuck into grease, soap, or preferably, beeswax. Slow seasoning or prechemical seasoning will reduce case hardening in hardwoods, and improve the nailing qualities.

Screws may not split some woods as easily as nails. Heavy dimension from some woods, such as live oak and some post oaks, is so hard after seasoning that they should be fastened with bolts, lag screws, dowels, or connectors.

Decay Resistance—Where wood is to be used in damp places or in contact with the ground, it should be put in dry and kept dry if possible. If moisture is likely to get in as with fence posts, or ventilation poor, as in the case of sills and floor joists, the heartwood of a decay-resistant species should be used or wood which has been treated with a preservative to make it rot and insect proof. The sap-wood of all species has low decay resistance. Wood of all classes will last indefinitely if kept continuously dry or continuously underwater or in cold temperatures. Wood absorbs more moisture at the ends of pieces and at contacts in construction, and preservative treatments or good coverage are more important at these points. Protective coatings reduce but do not prevent moisture absorption. Rapid drying as provided in vertical siding extends the service of the wood.

Knots and Other Defects—Knots and their locations, and other visible defects are the principal factors in grading lumber. They are the basis for determining the strength quality of ordinary grades of buildings or so-called lumber yard lumber. Knots on the upper side of a beam affect its bending

strength to a less degree because wood on the upper side is subjected to compression strength. Knots are, perhaps, less important in sound hardwoods for most farm uses.

Odor and Taste—Freedom from odor and taste as a property is important only when the wood is to be used for food containers. All woods have some odor when green but much less after drying.

Ease of Sawing, Planing, and Working

Softwoods with uniform texture generally saw into lumber faster than hardwoods and for that reason more of the harder woods often may be worked up into heavy dimension materials. Hard, heavy and dense woods also split less in nailing if cut into framing dimension for holding the nails. Drying may help in sawing some of the water saturated woods such as willow when cut in the spring. Fire scorched, pitchy, knotty and crooked logs, tough barked or dirt-filled barked logs saw with some difficulty. Smooth and straight bark trees of many species often indicate a wood of uniform grain, texture and working qualities.

Efficient sawing of soft textured woods require more set and hook in the teeth of saws. Increased lumber production with the light powered engines require cutting with as few teeth as practical and using large mandrel pulley. A fast running saw cuts smooth lumber but consumes power and saws the least amount of lumber.

Wood works more satisfactorily when dry. The grain of woods easy to work and finish will not chip, fuzz nor raise easily. The soft and uniform fine grain woods work and finish easily but the hardest woods of uniform texture take the best polish.

Clearing is needed for range improvement among mesquite, such as those pictured above in Central and West Texas. Also uses of wood should be developed.

The angle and bevel of planer knives and the speed of cutter heads must be changed somewhat according to species for successful surfacing of woods. As a rule, high cutterhead speed seems to give better results than lower speeds, and may make sanding unnecessary for final finishing. Small planers can be used if the lumber is sawed carefully and the sawmill is kept in adjustment. Having good lumber it is practical to make tongue and groove or lap edge with special type saws for light production.

Shaping: This is an operation not unlike planing except that the cutterhead speed of the shaper is greater and less wood is removed. All woods shape fairly satisfactorily at a slight angle to the grain. Shaping across the end grain is where the greatest differences in species show up in classification.

Turning: Some woods like beech, ash, and pecan turn relatively well regardless of moisture content. Others like cottonwood or willow, give good turnings if dried down to about 6% moisture content. The main points considered in quality of turning are general smoothness, sharpness of detail, and occurrence of broken or chipped edges, as affecting the amount of sanding necessary for greater smoothness.

Paint Holding: Paint holds better on some hardwoods than on pines and dries better on dry woods. For pines, as a rule, it holds better on edge-grain than on flat-grain surfaces, on clear or select grade than on knotty or pitchy, and on the bark side of flat-grain wood better than on the pith or core side.

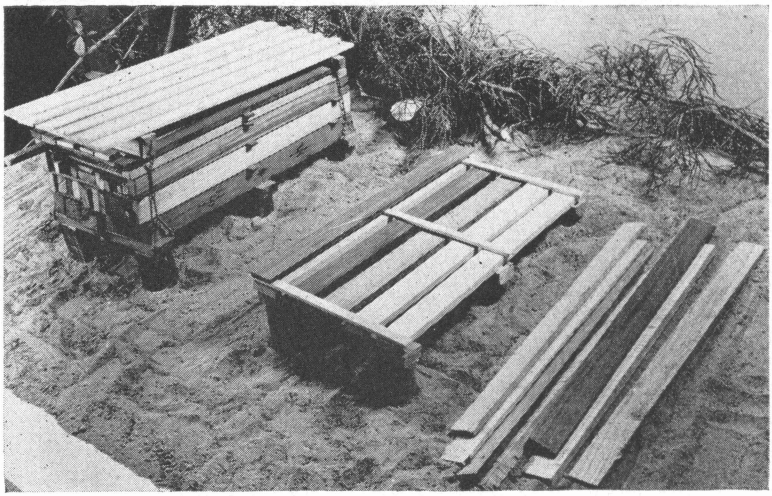
Amount of Figure: Figure is important in choosing wood to be varnished or waxed. Wavy and curly grain and coloring do not occur in all lumber of a given species but are obtained from occasional lumber, logs, stumps or trees; from flat or edge grain sawing, heart and sapwood combination, etc. Figured woods are wasted when crotches and crooked logs or gnarly stumps are left in logging operations. Stains sometimes are used to bring out or tone down the figure and variations in texture, and are substituted where natural colors are light or absent.

Seasoning (drying): Lumber can be used green for some purposes but unless properly dried some wood may warp, check, curl, cup or twist in use. Pines season easily while other woods cure with more or less difficulty. Lumber may be air seasoned by flat piling with cross stickers between layers, or end piling some easy drying species such as pine by leaning lumber flat against a support with one cross sticker at the top held between each layer of boards; crib (pen) piling; and racking (leaning lumber edge up with upper end resting on a ridge pole) or by suspending an end of a green wagon tongue or axe handle from a nail in the shop to season with a minimum of warping. If a bright surface is desired in carefully seasoned lumber it should be dipped in a sapstain preventative chemical solution before seasoning.

Lumber should be carefully piled for the best air drying. Drying can be controlled somewhat by the manner of constructing the piles but not as satisfactorily as with

the best kiln drying processes. Lumber piles for the outside should be laid on a platform of strong and durable wood, 1½ to 2 feet above the ground in front and sloping back about one inch drop to the foot to shed rain. The pile should also slope at the front approximately one inch out to one foot up. The first cross stickers to each layer of lumber is laid flush with the front end to shed rain. Other stickers are laid across each lumber layer at about three to five foot intervals and each succeeding sticker should lie approximately above the other in a perpendicular series with layers of lumber between them. Stickers are about 1 x 1½ inches but of various lengths and are seasoned to reduce sap stain on the lumber at the point of contact. For lumber to be seasoned for rough farm purposes boards of uniform thickness laid crosswise can be used for stickers. Two by fours dry with the least warping edgewise if piled on edge. The lumber in the pile should be spaced about two inches apart. Piles should not be wider than about eight feet without leaving ing a ventilation opening in the middle. The top of the pile is occasionally covered by less valuable lumber or slabs for a roof. Weights can be laid on top of the roof or a double wire run from each platform corner up to each end of a cross timber layed on top and twisted tight. This holds the pile compactly and minimizes warping during drying.

Seasoned lumber soon loses excess moisture absorbed from rain, frequently within a day of sunshine. Lumber is ordinarily air dried below its free water content (26%) to above 12% to 15% moisture content, which is satisfactory for most farm equipment. Moisture in wood can be reduced below air drying limits by kiln drying. Lumber kiln dried slowly to a low moisture content of about 6% is best for fine cabinet or interior



Native lumber should be carefully piled for the best air-drying.

finish work, wagon wheels, or some implement parts, where there is assurance it will be protected with paint or varnish and kept dry if possible to prevent further change in dimension. Inch lumber of pine and some hardwoods can be air dried from May until October in about one or two months but during winter very little drying takes place. It requires only a few days summer drying of cottonwood in the west part of the state. (See charts for average drying periods by species).

Chemical Treatments for Lumber Seasoning

Chemistry improves wood and developes many uses for our little-used woods. Extremely heavy and refractory woods, such as our strong and durable live oak or post oak and heavy dimension or timbers of other species season more satisfactorily after being soaked in a concentrated solution of certain salts to prevent checking and splitting. Pre-chemical seasoning is not important for most rough construction purposes on farms but may reduce splitting in nailing. Reducing case-hardening also makes the wood less resistant to nail driving. The period desirable for soaking green wood in a salt solution before air drying for farm use may be about one week for each two inches of wood thickness for the oaks.

Urea salt most commonly used for this and other wood treatments does not corrode nails or other metal. Common salt corrodes metal but galvanized nails, screws, bolts and other hardware may not be so affected. Lumber heavily treated with urea is also somewhat fire retarding, somewhat resistant to decay, bends when heated, and by subjecting to both heat and pressure produces from soft woods an entirely different wood of great hardness, and resistance and stability in dimension for higher uses.

Some Specific Uses of Wood on the Farm and Properties Required

Usual requirements of woods for house construction:

Exterior Trim—Medium decay resistance, good painting and weathering characteristics, easy working qualities, minimum warp.

Flooring—High resistance to wear, attractive figure or color, minimum warp and shrinkage. Many wood improvements are in process of development for flooring, interior trim, sash, shingles, siding and stepping.

Framing—High stiffness, good bending strength, good nail holding power, hardness, freedom from pronounced warp. Dryness and size of materials are important.

Interior-Trim with Natural Finish—Some figure is important, fine and uniform texture, hardness, absence of discoloring pitch, freedom from warp and shrinkage.

Interior Trim with Paint Finish—Fine and uniform texture, hardness,

absence of discoloring pitch, freedom from warp and shrinkage.

Lath—Low shrinkage, easy nailing, non-discoloration of plaster.

Roof Boards — High stiffness, good nail holding, small tendency to warp, ease of working.

Sash—Moderate shrinkage, good paint qualities, freedom from warping, ease of working, screw-holding power, and high decay resistance if used in wet places.

Shelving—Stiffness, good finishing qualities, freedom from pitch or warp, ease of working.

Shingles—High decay resistance, small tendency to curl or check, freedom from splitting in nailing. Thick butted and narrow shingles last longer. Shakes are long shingles, ordinarily not tapered, and probably split less in nailing and can be laid faster than shingles. Hardwood or pine shakes are produced efficiently by hand with a froe or by cutting thinboards on a sawmill. Shingles and shakes of non-durable woods are easily treated.

Siding — Good painting, easy working, freedom from warp.

Stepping—High decay resistance, non-splintering, good bending strength and wear resistance, freedom from warping.

Sub-floors—High stiffness, medium shrinkage and warp, ease of working.

H. P. King, Montgomery County farmer, makes ties and pulpwood, logs, and other products. His selective cutting of the largest pines each year has encouraged more hardwood than pine reforesting.

Wall Sheathing—Easy working and nailing, moderate shrinkage. All woods can be used if labor cost is not excessive. Diagonal sheathing increases the strength of a building several times that of horizontal sheathing and requires less frame bracing.

Usual Requirements of Woods for Barns and Sheds

Joists, Rafters, Plates — High bending strength, good nail-holding power, moderate shrinkage and medium ease of working. Woods of moderate bending strength can be substituted by use of large members.

Mangers—Hardness, non-splintering.

Roof Boards — High stiffness, good nail-holding, low shrinkage, medium decay resistance, freedom from splitting.

Siding and Barn Boards—Good painting or weathering qualities, freedom from warping and splitting, medium decay resistance. Medium bending strength in walls without foundation or interior lining.

Sills on Foundation Walls—Good nail holding, hardness, good decay resistance. High bending strength is important when supporting posts are used.

Stall Flooring—High decay resistance, uniform hardness, non-splintering.

Stanchions and Stalls — High bending strength, medium freedom from warp, moderate ease of working. May require good decay resistance where there is dampness.

Usual Requirements of Woods for Other Uses on Farms

Concrete Form — Almost all woods can be used.

Fence Posts—High decay resistance, narrow sap ring, medium bending strength, high staple or nail-holding. Non-durable species can be used if given a good preservative treatment. Considerable information on home treatments of fence posts and other wood used on the farm is available for free distribution.

Gates and fences — Moderate bending strength, medium decay and weather resistance, high nail-holding power, freedom from warp.

Scaffolding — High bending strength, high stiffness, high nail-holding power, medium weight.

Tanks and Vats—High decay resistance, low shrinkage and warping.

Troughs—Medium decay resistance, non-splintering, hardness, medium bending strength and decay resistance for supports where used.

Windmill, Well Platforms, and Bridges—High decay resistance, good bending strength, non-splintering, uniform hardness.

Explanation of the Charts—The following charts (tabulations) are to supply specific wood-use information on the native timber species or group of species of somewhat similar characteristics which grow on Texas farms and ranches. It is not often that one property or use alone controls the choice between woods and trees; it is more important to know a combination of the important properties required. For example, the widespread distribution of the post oak on good or poor soils and its many possible uses combine to make the tree and wood meet many farm requirements satisfactorily.

The quality of the species for specific uses are graded in the chart tabulations using both capital and small letter characters. The grading, based largely on experience and observation, is by no means exact. The capital letters, A, B, C, indicate the grading done by the U. S. Forest Products Laboratory for some of the woods of more common commercial use in the past and largely old growth timber. They represent grading based on thorough investigations and experience, and these grades assist in grading other woods in similar respects. The small letters a, b, c, and occasionally d and (') for other woods are opinions and observations with some cutting and trying by the writer, and although they have been checked in the tabulations by some wood technologists, lack the well established proof of long time and wide-spread use of the more commonly used

Pines reforest grow better by even-aged groups. King has clear cut a patch to see if repetition will occur.

woods from large or old growth trees which have been depleted to less than 10% of the present Texas forests.

Definitions of the A, B, C, Characters Used

Class A or a, in the following tables, includes trees or their woods which are relatively high in the specific use, property or characteristic listed and to a considerable extent combine the usual requirements in a **high degree.** Class B or b are intermediate in

CHARACTERISTICS, ABUNDANCE, OCCURRENCE AND USES OF THE TREES

Trees in Texas Farm Woodlands (Most farm forests from the soil to the tree tops should be balanced in nature.)	Size and form of tree for most requirements	Size and form of tree for usual requirements	Growth rate	Abundance of seedlings and young trees	Abundance of older trees	Relative abundance in State by regions: E.Tex.,or pine-hardwood	Relative abundance in State by regions: E.Cent.,post oak-hardwood	Relative abundance in State by regions: Cent.,cedar-mesquite-hdwd.	Occurrence on uplands	Occurrence on lowlands	Occurrence on sandy sls.	Occurrence on lime soils	Resistance to drouth	Resistance to disease	Resistance to insects	Resistance of bark to fire	Resistance to animals
Ash, white	b	b	b	c	c	c	b	c	d	c	c	d	b	a	b	c	b
Basswood (linn)	b	b	b	d	d	c			d	c	c		c	a	a	b	c
Beech	b	b	b	d	c	c				c	c		c	b	a	c	c
Birch, river	c	c	b	d	c	c	c			c	c		c	a	a	c	c
Bois d'arc	c	b	b	c	c	c	b	c	d	c	d	c	b	a	a	b	b
Box elder	c	b	b	d	c	d	c	c	d	c	d	c	b	b	b	c	c
Cedar, eastern red	c	b	b	c	b	c	b	c	b	c	b	c	a	a	a	c	a
Cedar, mountain	d	b	d	a	a		d	a	a	c	c	b	a	a	a	c	a
Cherry, black	c	c	b	d	d	d	d	d	d	b	d	d	c	b	b	d	b
Chinquapin	d	c	b	d	d	d			d	d	d		b	a	a	c	b
Cottonwood	a	a	a	c	c	c	b	c	d	c	c	d	b	a	a	b	b
Cypress	b	b	b	d	d	d	d	d		d	d		c	a	a	b	c
Dogwood & persimmon	d	c	c	c	c	b	c		c	d	c		c	a	b	c	b
Elm, hard	b	b	b	a	a	c	a	b	c	a	b	c	b	a	b	b	b
Elm, soft	b	b	b	d	c	c	c		d	c	b	c	b	a	b	b	b
Gum, elastic(chittam)	c	c	c	d	d	d	d	d	d	d	d	d	a	a	a	b	a
Gum, black & tupelo	b	b	c	c	c	c	c		d	c	c		c	a	a	b	b
Gum, sweet	a	a	b	a	a	a	c		c	a	a		c	a	a	b	c
Hackberry	b	b	a	a	b	c	b	c	c	b	b	c	b	a	c	b	b
Holly	d	c	d	d	d	c	c			d	d		c	a	a	c	a
Hickories	c	b	c	c	c	c	b	d	c	d	c	c	b	a	b	b	a
Locust, black	d	c	b	d	d	d	d	d	d	d	d	d	a	a	c	c	c
Locust, honey	c	c	b	c	d	c	c	c	d	d	d	d	a	a	a	c	b
Mesquite	d	d	d	a	a	d	b	a	a	c	c	a	a	a	a	c	b
Magnolia, evergreen	b	b	b	d	c	b				c	c		c	a	a	b	c
Maples, hard	c	c	c	d	d	d			d	d	d		c	a	a	b	c
Mulberry	c	b	c	d	d	d	c	d	d	d	d	d	a	a	a	b	b
Oaks, red group	b	b	b	b	b	c	b	c	c	b	b	c	b	a	b	b	b
Oaks, white group	b	b	b	c	c	c	b	c	c	b	b	c	b	a	b	b	c
Oak, post (W.group)	b	b	c	a	a	c	a	b	a	c	b	c	a	a	b	b	b
Oak, live (W.group)	c	c	b	a	b		a	b	b	c	b	b	a	a	a	b	a
Pecan	b	b	b	b	c	c	b	c	d	c	c	c	c	a	b	c	a
Pines,L.L.,S.L.,Lob.	a	a	b	a	a	a	d		a	c	a		b	a	b	b	b
Sassafras	d	c	c	c	d	c	d		d		d		b	a	a	c	b
Sycamore	b	b	b	d	c	c	c	c		c	c		c	a	a	c	b
Walnut	b	b	b	d	d	d	d	d		d	d	d	b	a	b	b	a
Wild china(soapberry)	c	c	c	d	d	d	c	d		d	d	d	a	a	a	b	b
Willow, black	c	c	a	b	b	c	b	c		c	b	c	c	a	b	b	c

most respects and combine the usual requirements in a **good degree.** Class C or c, are trees or their woods which are relatively low in the specific property, characteristics or particular respect listed, and combine the usual requirements in a **fair degree.** In

CHARACTERISTICS, ETC. OF TREES. (CONT'D.)

TREES IN FARM WOODLANDS OF TEXAS (Idle lands make idle hands) (A forest produces the best wood, reforests continuously, and serves us best if we cut timber wisely, lightly and often.)	Shade & ornamental use	Windbreaks for prairies and plains	"Fruit" for wildlife, domestic animals or humans	Browse for animals	Pulp and paper use (?) = no test	Chemical use. Some not tested	Need for continuous reforesting on farms. (Based on value-scarcity practicability.)	Ease of Reforesting (Data by U.S.Forest S.) "S"=sprouts. "W"=wildings. By nature:seed or sprouts (Most economical method.)	By planting seed	By planting seedlings	By cuttings
Ash, white	b	c	c	c	?		a	a	c	a	-
Basswood (linn)	a		c	c	b		b	b	c	b	-
Beech	a		a	b	?	b	b	b	-	b	-
Birch, river	a			b	?	c	b	a	-	c	-
Bois d'arc	c	a		c	?	a	a	a,s	-	b	-
Box elder	b	c	c	c	c		c	a'	b'	b'	-
Cedar, eastern red	a	a	a	c	?	a	a	b	-	c	-
Cedar, mountain	c	a	c	c	?	a	c	a	-	?	-
Cherry, black	a	c	a	tox.	?	b	a	b'	b	b	-
Chinquapin	a		a	b	?	b	a	b	-	-	-
Cottonwood	b	a		a	b		a	a,s	-	a,w	a
Cypress	a				?		a	c	-	c	-
Dogwood & persimmon	a		a	c	?		a & c	a&(a,s)	-	c & b	-&b
Elm, hard	a		c	a	?	b	b	a	-	a	-
Elm, soft	b	a	c	a	?		b	b'	-	a	-
Gum, elastic (chittam)	b	b	a	c	?		b	b'	-	?	a
Gum, black & tupelo	b		c	c	a		b	b&b	-	b & b	-
Gum, sweet (red)	a		c	a	b	a	b	a	b	b	-
Hackberry	b	a	c	c	?		b	a	b	a	-
Holly	a	a	c		?		a	b	-	c	-
Hickories	b		a	c	?		b	b	b	-	-
Locust, black	b	b		a	?		a	a	a	a	-
Locust, honey	d	b	c	c	?		d	b	b	a	-
Mesquite	c	c	c	a	?		?	a	-	b	-
Magnolia, evergreen	a			a	c		a	b	-	b	-
Maples, hard	b		c	a	c	a	b	a	b	a	-
Mulberry	b	a	a	c	?	b	a	b	-	b	-
Oaks, red group	a		b	c	c	a	b	a	c	b	-
Oaks, white group	a		a	a	c	b	a	a	c	b	-
Oak, post (W.group)	a	a	a	b	c	b	a	a	c	b	-
Oak, live (W.group)	a	a	a	b	?	b	c	b	c	b	-
Pecan	a		a	c	?		a	b	c	a	-
Pines, L.L., S.L., Lob.	b	b	b	c	a	a	a	a	b	a	-
Sassafras	c		c	c	?	b	b	a	c	a	b
Sycamore	a	a		c	?		b	a	c	a	-
Walnut	a		a	c	?	b	a	b	a	b	-
Wild china (soapberry)	b	c		c	?		b	b'	-	a	-
Willow, black	c	c		a	b		b	a	-	a,w	a

CHARACTERISTICS AND PROPERTIES OF WOODS

Woods from Farm Woodlands of Texas (Good woods for the farm: ones that are strong, durable, and suitable for most purposes.)	Average wt. lbs. per cubic foot, green wood	Average wt. lbs. per cu. ft. air dry (12% moisture content)	Average no. days for green 1" lumber to air dry to 20% moist. content.	No. days for 1" lumber (20% moist.) to kiln dry slowly to 6% moist. cont.	Hardness	Toughness	Stiffness	Bending strength	Strength as a post (prop.)	Freedom from shrinkage	Freedom from warping	Nail-holding	Splitting in nailing	Screw-holding	Splitting in screwing
Ash, white	49	41	90	4-7	A	A	A	B	A	B	B	A	B	B	A
Basswood (linn)	42	26	45	3-5	C	C	B	C	C	C	B	C	B	C	C
Beech	54	45	175	6-8	A	B	A	B	B	C	C	A	C	A	C
Birch, river	57'	44'	175	5-8	b	b	A	a	b	b	b	a	C	b	c
Bois d'arc	62	50'	100'	?	a	a	a	b	a	b	b	a	c	a	b
Box elder	50'	35'	50'	?	c	c	b	c	c	b	b	b	b	b	b
Cedar, eastern red	37'	33	60'	?	A	c	C	c	b	A	A	b	b	c	c
Cedar, mountain	37'	33'	70'	?	a	b	b	c	a	a	a	a	b	b	c
Cherry, black	46	35	125'	5-7	b	b	A	b	b	a	a	b	b	b	a
Chinquapin	55'	30'	90'	4-8'	a	b	c	b	b	b	b	a	b	a	c
Cottonwood	49	28	40'	?	C	C	B	C	C	c	C	C	A	C	A
Cypress	51	32	275	?	B	B	B	c	B	B	B	B	a	c	c
Dogwood & persimmon	64	52	?	?	a	a	a	b	a	b	b	a	b	a	c
Elm, hard	53'	40'	105	4-6	A	B	A	a	B	C	B	a	b	a	b
Elm, soft	54'	36'	105	4-6	A	B	B	A	B	C	C	A	A	B	A
Gum, elastic(chittam)	52'	38'	100'	?	a	a	a	b	a	c	c	a	b	a	b
Gum, black & tupelo	50'	35	90	5-7	A	b	b	B	b	B	C	a	B	B	B
Gum, sweet	50	34	110	5-7	B	B	B	B	B	C	C	B	B	B	B
Hackberry	50	37	100'	?	A	C	C	b	C	C	B	a	C	B	B
Holly	57	40	100'	?	a	b	b	c	b	b	b	b	b	a	b
Hickories	62'	49'	175'	8-14	A	A	A	a	A	C	B	A	C	A	B
Locust, black	58	48	100'	?	A	A	A	b	A	B	B	A	c	a	b
Locust, honey	61	?	150'	?	A	A	A	b	A	B	B	A	c	a	c
Mesquite	58'	48'	100'	?	a	d	a	b	a	b	b	a	c	a	c
Magnolia,evergreen	59	35	80	4-6	b	b	b	A	b	b	b	b	B	B	A
Maples, hard	52'	42'	175'	5-7	A	b	A	B	b	B	B	A	C	a	B
Mulberry	60'	48'	100'	?	a	a	a	b	a	b	b	a	c	a	b
Oaks, red group	63'	45'	210	4-8	A	B	A	A	B	C	B	A	B	A	A
Oaks, white group	65'	48	270	6-12	A	B	A	A	B	C	B	A	B	A	A
Oak, post (w.group)	63	47'	270'	6-10'	a	a	a	a	a	c	c	a	b	a	a
Oak, live (w.group)	76	62	300'	10-14'	a	a	a	a	a	c	b	a	b	a	a
Pecan	61	46	175'	?	A	A	A	a	A	C	B	a	c	A	B
Pines,L.L.,S.L.,Lob.	52'	38'	55	?	A	A	A	b	A	B	B	A	c	b	b
Sassafras	44	31	50'	?	a	b	b	b	b	b	b	a	c	b	b
Sycamore	52	34	175'	?	A	b	B	C	b	C	C	A	A	B	A
Walnut	58	38	150'	6-8	A	A	a	a	A	B	A	a	b	a	a
Wild china(soapberry)	49'	41'	90'	?	a	a	a	b	a	b	b	a	c	a	b
Willow black	50	26	30'	?	c	c	c	a	c	c	c	c	A	C	B

CHARACTERISTICS AND PROPERTIES OF WOODS (Continued)

Woods from Farm Woodlands of Texas (Preservative treatment makes most non-durable woods good for farm use.)	Decay resistance of heart wood	Proportion of heart wood	Freedom from odor and taste (dry)	Number of knots	Number of other defects	Ease of sawing into lumber (green)	Ease of working (dry)	Ease of planing	Ease of shaping	Ease of turning	Easy gluing for strong joints	Ease of finishing (?)	Amount of figure	Paint holding
Ash, white	C	C	A	C	B	b	C	B	B	B	B	c	A	c
Basswood (linn)	C	C	A	C	C	c	A	B	C	C	B	b	C	a
Beech	C	B	A	B	A	c	C	A	B	A	C	c	B	b
Birch, river	c	c	a	c	B	c	c	C	a	a	b	b	b	b
Bois d'arc	a	a	b	c	c	c	c	c	b	b	c	c	a	c
Box elder	c	c	a	c	c	b	b	b	c	c	b	b	c	b
Cedar, eastern red	A	B	c	d	C	b	B	c	c	c	b	a	B	a
Cedar, mountain	a	a	c	d	c	c	b	c	c	c	b	a	b	a
Cherry, black	a	b	b	c	c	b	a	b	a	a	b	a	b	b
Chinquapin	a	b	b	c	c	b	b	b	b	b	c	c	b	c
Cottonwood	C	C	B	C	C	b	B	C	C	C	B	b	C	b
Cypress	A	B	B	C	B	c	B	a	b	b	b	b	A	A
Dogwood & persimmon	c	c	b	c	c	c	c	a	a	a	c	b	c	b
Elm, hard	B	B	A	B	B	b	C	b	b	b	c	c	A	c
Elm, soft	B	B	A	B	A	b	C	C	B	C	C	c	A	c
Gum, elastic(chittam)	c	c	b	c	c	b	c	a	a	a	c	b	b	c
Gum, black & tupelo	c	C	A	C	C	b	C	B	b	b	C	b	C	b
Gum, sweet	B	B	B	C	C	b	B	A	B	A	C	b	B	b
Hackberry	c	C	A	C	B	b	C	A	B	B	A	c	A	c
Holly	c	c	a	c	b	c	c	a	a	a	c	b	c	a
Hickories	C	B	b	c	B	c	C	C	A	A	C	b	B	c
Locust, black	A	A	B	B	b	c	C	c	b	b	c	c	A	c
Locust, honey	B	B	B	B	B	c	C	c	b	b	c	c	A	c
Mesquite	a	a	b	c	b	c	c	c	b	b	c	c	a	b
Magnolia	c	c	b	c	a	b	b	A	C	B	C	b	b	a
Maples, hard	C	C	A	B	B	b	c	C	b	b	c	b	B	b
Mulberry	a	a	b	b	b	b	b	b	b	b	c	c	a	c
Oaks, red group	C	B	b	C	B	b	C	A	A	B	C	c	A	c
Oaks, white group	A	B	b	C	B	c	C	A	A	B	C	c	A	c
Oak, post (w.group)	a	b	b	c	c	c	c	a	a	b	c	c	a	c
Oak, live (w.group)	a	b	b	c	c	c	c	b	b	b	c	c	a	c
Pecan	C	B	b	C	A	c	C	b	A	A	B	b	B	c
Pines,L.L.,S.L.,Lob.	B	C	C	C	B	a	C	a	b	b	b	b	A	C
Sassafras	a	b	c	b	c	b	c	a	b	b	b	c	a	c
Sycamore	C	B	b	C	B	c	C	C	A	A	C	b	B	c
Walnut	A	B	a	C	C	b	B	b	a	a	c	c	B	c
Wild china (soapberry)	c	c	b	c	c	b	c	b	a	a	c	c	a	c
Willow black	c	c	c	c	c	c	c	C	C	C	A	b	c	a

other words, the Laboratory's A., B., and C., or the writer's a, b, c's mean high, good and fair respectively.

All trees or woods in the same class are not equal in all respects, and no attempt is made to draw fine distinctions between species. Details are necessarily sacrificed in favor of the simplicity desired for farm use. Industrial uses of a specific character will require more exacting information which is being developed continuously by the State and Federal Forest Products Laboratories and a few industries.

SELECTION OF WOODS FOR FARM USES

Woods from Farm Woodlands of Texas (Good wood for most farm requirements can be selected from about 15 million acres of woodlands distributed on more than 200,000 Texas farms.)	FARM HOUSE CONSTRUCTION (Average length of lumber used for house, barns, sheds, and other farm construction is 8 feet.)															
	Exterior trim	Flooring	Kitchen floor	Porch floor	Framing	Interior trim natural finish	Interior trim paint finish	Lath, plaster	Roof boards	Sash	Shelving	Shingles	Sidings	Stepping outdoors	Sub floors	Wall sheathing
Ash, white	b	A	B		A	A	B		A	c	A		b	c	A	
Basswood (linn)							B	C		c	B	c	b			a
Beech		A	A		A	B	B		A	b	b	b	c	c	B	c
Birch, river		b	b		a	a	b		c		a	c		c	b	
Bois d'arc		a	a	a		a	a				a			a		
Box elder		c	c	c	c	b	b		c	c	b	c	b	c	c	c
Cedar, eastern red	a			a		A			c	a	a	b	b	c		
Cedar, mountain				a		b			b	b	b	b	b	a		
Cherry, black		b		b		a				a	a			a		
Chinquapin		b		a		a					b	b		a		
Cottonwood	c	c	b		b		c	c	c			c	c			B
Cypress	A	B	C	A	A	b	b	b	A	A	A	A	A	A	A	A
Dogwood & persimmon		c														
Elm, hard		c	C		C	c			A		a	b	c	b	B	
Elm, soft			C		C	c			B	c	a	c	c	c	B	b
Gum, elastic(chittam)		b		c		b					b			c		
Gum, black & tupelo		b			C		B		A		b			c	B	b
Gum, sweet		B			C	B	B	c	b		a	c	c	b	c	b
Hackberry			C						A		b	c	c	c	B	
Holly						c					b					
Hickories		A														
Locust, black		A		A		a				a				A		
Locust, honey		a				b								c		
Mesquite		a		a		a				a	a	a		a		
Maples, hard		A	A		A	B	B		A		A	c			B	
Magnolia, evergreen		c				b		c	b		a	c	b		c	b
Mulberry		a	a	a		a	a				a	a		a		
Oaks, red group	b	A	B		A	A	B		A		A	b	c	b	B	
Oaks, white group	A	A	B	A	A	A	B		A	B	A	A	c	A	B	
Oak, post (w.group)	a	a	b	a	a	a	b		a	b	a	b	c	a	b	
Oak, live (w.group)	a	a	b	a	a	a	b		a	b	a	a	c	a	b	
Pecan		A		b		b			c		a	c			b	
Pines,L.L.,S.L.,Lob.	B	B	C	A	A	b	b	C	A	B	B	b	C	B	A	B
Sassafras				b		b	b	c		b		a		b		
Sycamore		B	C		C	A	c		b			c				
Walnut		A		A		A				a	A			A		
Wild china(soapberry)	a	a	b	a	a	a	b		a	a	a	a	c	a	b	
Willow, black						c	b		c			c	b			b

SELECTION OF WOODS FOR FARM USES (Continued)

Woods from Farm Woodlands	Barns, Sheds, Etc.								Other For Wood																
Where logs are short or if mill equipment is too expensive to saw long lumber, short lengths can often be used satisfactorily by splicing some members.	Jsts.,plts.,rftys.	Managers	Roof boards	Siding, barn	Sills	Stall floor	Stalls	Studding	Concrt. form	Tongues,dbl.tr.etc.	Fence posts,(hrt.w.)	Gates & fence	Scaffolding	Tanks & vats	Troughs	Well platform	Fuel wood	Cases,crts.,boxes	Bridges & culverts	Handles-ax,hammer	Handles-hoe,rake	Implements	Wagon boxes	Woodenware	Furniture
Ash, white	A	A	b	b	C	A	B	B	c	a		b	A		b		a		c	b	a	a	c	b	b
Basswood (linn)	C	c	b	b					C								c	a				c	a	a	c
Beech	A	A	B	b	C	A	B	B	C	c		B	b		b		a	b	c		b	b	c	a	c
Birch, river	a	a	b	c	c	c	b	b	c			b	b		b		a	b		c	c	b		c	b
Bois d'arc		A		b	a	A	A			a	A	a		a	a	a	a		a	a	a	a		b	a
Box elder	c	c	b	b		b	c	c	c			c	c	c	c	c	b	c					b	c	b
Cedar, eastern red		b	b	b	b	b				c	a	b		b	a	a	b		c					c	a
Cedar, mountain	c	a	b	b	b	b	c			c	a	b		b	a	a	b		c		c	c		b	c
Cherry, black										b	b	a		a	a	b	a				c	b	b	a	a
Chinquapin					b	b				a	a			b	b	b	a		c	c	c	b	c	b	b
Cottonwood	C	c	b	b	c	c	b	c	C			b	c		b		c	a				c	a	a	c
Cypress	B	C	a	A	A	c	c	A	b			a	a		A	A	A	c	b	c		c	c	b	c	c
Dogwood & persim.						b	b			a							a			b	b	a		b	c
Elm, hard	B	A	B	b	B	A	A	B	c	a	c	b	B	c	b	c	b	b	c	c	b	a		b	b
Elm, soft	c	A	B	c	C	A	B	B	c	c		b	c		b		b	a	c		c	c	c	c	b
Gum, elastic	b	c	b	c	c	c	b	c	c	b		b	c		c	c	b		c	b	b	b			b
Gum,black & tupelo	B	A	b	b	c	A	b		C	c		B	c				b	b	c	c	c	b	b	b	b
Gum, sweet	B	A	B	a	c	c	B	B	C		b	B	c	b	b	c	b	b	c			c	b	c	b
Hackberry	B	a	a		c			B	c	b		c	c				b	b	c	c	a	b		c	b
Holly		b					b			c					c		c		c	c	c	c	b	a	b
Hickories	a	A				A	B			a			b				a		c	a	b	a		c	c
Locust, black	c	A			a	a	A	B		a	A			b	a	A	a		a	a	b	a		b	a
Locust, honey		a				b	a			b	c	b			b		a		b	b	b	b		b	c
Mesquite		a				b				b	a	b		b	a	a	a		c			b		c	b
Magnolia Evergreen	b		b	b	c	c	b					b	c		c		c		c	b	c	b	c	b	c
Maples, hard	A	A	B	b	C	c	B	B	C	a		B	B		b		a		c		b	a		a	a
Mulberry				a	a	a	a			a	a	a		a	a	a	a		a	b	a	a		b	a
Oaks, red group	A	A	B	b	C	A	B	B	C	b		B	B		b		a		c	c	b	b		c	a
Oaks, white group	A	A	B	a	A	A	A	B	C	a	b	A	B	A	A	A	a		a	b	b	a		c	a
Oak, post(w.group)	a	a	b	a	a	a	a	b	c	a	b	a	b	a	a	a	a		a	b	b	a		c	a
Oak, live(w.group)	a	a	b	a	a	a	a	b	c	a	a	a	b	a	a	a	a		a	b	b	a		b	a
Pecan	a	a	b	c		b	b			a		b	a		c		a		c	a	b	a		c	b
Pines, southern	A	C	A	B	B	B	C	A	A	c	c	A	A	B	B	c	a	a	c		b	b	c		b
Sassafras					a	b				c	b			b	a	b	b		c		c	c	c		b
Sycamore	B	b		b	C	c	b	B	c			b	c		c		b	b	c		c	b	c	c	b
Walnut					a	a				a	a	a	b	a	a	a	a		a	b	b	a	b	a	a
Wild china	a	a	b	a	a	a	a	b	c	a	c	a	b	b	a	a	a		c	b	b	a		c	
Willow, black	c	c	b	b		c	c		c	c		b	c		c		c	a			c	c	a	a	c

DISTINCTIVE USES OF WOODS GROWN IN TEXAS FARM WOODLANDS

Woods from Farm Woodlands of Texas. (Experience is a wise teacher in the use of woods.)	MOST COMMON FARM USES Most farm uses of wood require that timber must first be made into lumber. Timber uses best determine timber values.
Ash, white	Handles for hoes, rakes, forks & shovels; implements, fuel
Basswood (linn)	Woodenware, wagon boxes, boats
Beech	Woodenware, containers, fuel, hand saw handles, construction
Birch, river	Millwork, furniture - Of rather low value.
Bois d'arc	Posts, sills, house pins, shed posts,implements,handles (val.tree)
Box elder	Woodenware, boxes, crates, furniture, wagon boxes
Cedar, Ea.red	Posts, lumber, furniture (valuable farm tree) wild life tree
Cedar, mountain	Posts, fuel, pole construction,can live with little soil & moisture
Cherry, black	Furniture, valuable for wild life
Chinquapin	Posts, nuts
Cottonwood	Wagon boxes, containers, lumber, shingles, crib flooring
Cypress	Silos, tanks, lumber, boats, shingles.
Dogwood & Persim.	Gluts or wedges, mallets, handles
Elm, hard	Implements, lumber, furniture, crates (widely distributed)
Elm, soft	Cheese boxes, lumber, crates
Gum, elastic	Implements (attractive speckled wood and works well) wildlife tree
Gum, black & tup.	Fruit and vegetable boxes
Gum, sweet	Boxes, baskets, crates, lumber furniture
Hackberry	Furniture, lumber (grows well in black land)
Holly & yaupon	Ornamental, Christmas greenery (yaupon for handles & browse)
Hickories	Handles for axes, mattox, implements,meat smoking,food,(vehicle pt)
Locust, black	Posts, wagon fellies, spokes, hubs (See bois d'arc)
Locust, honey	Furniture, flooring, interior trim, fuel (very hard wood)
Mesquite	Posts, small dimension lumber, fuel, shingles?, fixtures
Magnolia, Ever.	Wagon boxes, furniture, interior trim
Maples, hard	Implements, flooring, syrup
Mulberry	Posts, sills, house pins, fruit (valuable farm tree)
Oaks, red group	Implements, lumber, furniture, fuel
Oaks, white gr.	Posts, implements, lumber, furniture (valuable farm tree)
Oak, post(w.group)	Posts, fuel, implements, lumber, furniture (valuable farm tree)
Oak, live(w.group)	Posts, fuel, implements, lbr., furniture, sills (valuable farm tree)
Pecan	Wagon parts, lumber,flooring, implements, food (see hickory)
Pines, southern	Lumber for general construction (easily marketed), pitch products
Sassafras	Posts, beverage, wildlife cover and wind break along fences
Sycamore	Baskets, boxes and crates, furniture, cutter blocks
Walnut	Furniture, nuts, fixtures, flooring, handles (valuable farm tree)
Wild china	Implements, double trees, handles, (see ash)
Willow, black	Light implement parts, strong for its weight.

DISTINCTIVE USES OF WOODS GROWN IN TEXAS FARM WOODLANDS (Continued)

Woods From Farm Woodlands of Texas (Lumber is the spring board to most wood-using industries.)	MOST COMMON INDUSTRIAL USES (In parenthesis is the number of various kinds of wood-using industries in America which use each species. Ninety per cent of the wood materials used by these industries is lumber.)	
Ash, white	Handles, vehicle parts, athletic goods	(30)
Basswood (linn)	Fixtures, furn. patterns, boxes, millwork, (Ven. blinds) excel.	(40)
Beech	Woodenware, flooring, furn., machine parts, chem. dist'l., ply wood	(29)
Birch, river	Little for furniture (Treated wood with bark on attractive	
Bois d'arc	Wagon fellies, dye extract, paving blocks, archery	(5)
Box elder	Novelties to slight extent	
Cedar, ea. red	Chests, pencils, closet lining, furniture	(12)
Cedar mountain	Posts, novelties	
Cherry, black	Electrotype blocks, furniture, interior trim, fruit	
Chinquapin	Chemical distillation, posts, nuts	
Cottonwood	Boxes, cases, crates, furniture, wagon boxes, veneer, ply wood	(23)
Cypress	Greenhouses, tanks, construction, shingles, mill work	(27)
Dogwood & per.	Shuttles, spindles, golf clubs, mallets, wedges	(4)
Elm, hard	Containers, cooperage, saddle trees, furniture, fixtures	(24)
Elm, soft	Containers, crates, veneer & ply wood	(24)
Gum, elastic	(Probably suitable for rulers and instruments?)	
Gum, black & tup.	Factory flooring, boxes & crates, furniture, veneer, ply wood	(24)
Gum, sweet	Furniture, mill work, containers, many uses, veneer, ply wood	(39)
Hackberry	Automobile bodies, furniture, crates, veneer	(8)
Holly	Wood inlaying, Christmas greenery (too scarce to use)	(4)
Hickories	Handles, implements, athletic goods, nuts	(24)
Locust, black	Insulator pins, wagon wheels	(4)
Locust, honey	(Probably excellent for furniture, floors, int. trim instruments)	
Mesquite	Novelties, paving blocks, (might substitute some walnut & teak uses)	
Magnolia, Ever.	Interior trim, venetian blinds, furniture, veneer	(21)
Maples, hard	Flooring, furniture, machine parts, veneer	(44)
Mulberry	Posts	
Oaks, red	Furniture, flooring, implements, interior trim, ties, veneer	(38)
Oaks, white	Cooperage, furniture, flooring, implements, int. trim, veneer	(38)
Oak, post	Same as white oak, bridging, lumber	(38)
Oak, live	Heavy timbers, bridging, lumber, braces for heavy const.	(38)
Pecan	Furniture, flooring, automobile bodies, implements, nuts	(7)
Pines, Southern	Construction lumber, crates, pulpwood, poles, ties, chem., ply wood	(39)
Sassafras	Flavoring, beverage (wood appearance resembles chestnut)	
Sycamore	Boxes, crates, mill work, meat blocks, inlaying, veneer, ply wood	(14)
Walnut	Furniture, mill work, guns, fixtures, interior trim, veneer	(24)
Wild china	(Probably better than ash for its uses) ?	
Willow, black	Artificial limbs, charcoal for gas masks, polo balls	(16)

SOME FINISHES FOR WOODS, BRIEFLY INDICATED

Kind of Wood

Fine grained woods appear to be easiest to finish. They also retain water soluble preservatives better than coarse grain woods. Such preservatives do not interfere with painting or other finishes.

Woods classed (x) according to grain & kind of filler to use.

(To finish the wood of any species follow the steps below indicated by the (X's) which also include suggested stages for applying the filler in 11 or 14. If there is no information, one may follow some of the steps given for similar woods. Finishing also may be possible by following the X's to about No. 15 then dry, clean & wax or spray with a quick drying lacquer. The lacquer finish is afterwards rubbed, polished & oiled to remove dust. The finishing room should be free from dust.)

	Fine grain. Pores invisible Use liquid filler or shellac	Moderately fine grain. Pores generally visible. Can use past filler but liquid filler or shellac generally used.	Coarse grain. Pores large. Use paste filler or gluesize	Planing smooth	Scraping smoother	Sanding, fine paper	Sponging, damping	Resanding, fine paper	Water-staining	Oiling	Oil-staining	Shellac-wash	Dusting	Paste filler (11)	Sanding, fine paper	Dust & clean	Shellac-primer (14) -	Sanding, fine pap. (15)	Reshellacing	Cleaning	Varnishing	Sanding	Revarnishing	Rubbing-pumice	Polishing	Cleaning	Flat varnish	Lacquering	Relacquering	Rubbing	Cleaning	Polishing	Waxing
Ash, white			x	x	x	x	x	x	x				x	x	x	x	x	x	x			x	x	x	x		x					
Basswood (linn)	x	or x		x		x					x					x	x	x		x								x	x	x	x	
Beech		x	or x																													
Birch, river		x		x	x	x	x	x	x							x	x	x		x	x	x	x	x	x		x					
Bois d'arc			x																													
Box elder		x																														
Cedar, east. red	x			x		x										x	x	x	x													
Cedar, mountain	x																															
Cherry, black		x		x	x	x											x	x										x	x	x	x	
Chinquapin			x	x	x	x					x		x	x	x	x	x	x		x	x	x					x					
Cottonwood		x																														
Cypress	x			x		x					x					x	x	x		x								x	x	x	x	
Dogwood & Persim.	x																															
Elm, hard			x																													
Elm, soft			x																													
Gum, elas. (chittam)		x	or x																													
Gum, black & tup.	x																															
Gum, sweet		x		x	x	x	x	x	x							x	x	x		x	x	x	x	x	x							
Hackberry			x																													
Holly	x																															
Hickories			x																													
Locust, black			x																													
Locust, honey			x																													
Mesquite			x																													
Magnolia ever.	x																															
Maples, hard		x		x	x	x							x	x	x	x	x	x		x	x	x	x	x	x	x						
Mulberry			x																													
Oak, natural			x	x	x	x							x	x	x	x	x	x		x	x	x	x	x	x	x						
Oak, stained			x	x	x	x	x	x	x				x	x	x	x	x	x		x	x	x	x	x	x							
Oak, mission			x	x	x	x	x	x	x							x	x	x										x	x			x
Pecan			x																													
Pines, southern	x			x		x					x					x	x	x		x	x	x	x	x		x						
Sassafras		x	or x																													
Sycamore			x	x	x	x										x	x	x		x	x	x	x	x	x	x						
Walnut			x	x	x	x				x		x	x	x	x	x	x	x		x	x	x	x	x	x	x						
Wild china			x																													
Willow, black	x																															

Wood Finishing

Natural finishes of most woods used for furniture, interior trim, etc., means planing, scraping, sanding, staining, filling, dusting, cleaning, shellacking, varnishing, lacquering, waxing and rubbing. To start with, the surface must be perfectly smooth. Use a sandpapering block if work is by hand and the finest sandpaper toward completion.

Oil stain may not raise the grain badly but it does not penetrate as deeply nor give as clear a color as water, spirit or acid stains. Brush or dip on stain liberally but wipe off surplus. If grain rises after drying, a thin coat of shellac will stiffen the fibers which then can be smoothed with fairly fine sand paper.

If the wood is porous, a paste filler about as thick as cream must be used, preferably of the same color as the stain. Apply smoothly and allow to set for about 12 hours. For moderately porous woods shellac is used as a filler and several thin coats should be applied rather than one heavy coat. Rub lightly between coats after drying with No. 00 sandpaper and final coat with steel wool or pumice stone powder using a felt pad.

Clean and dust thoroughly and allow dust to settle in the room before varnishing. Spread the varnish thoroughly with the brush and finish last stroke with no excess varnish on the brush to be removed. If more than one coat is applied, careful cleaning as described is then followed between coats.

Waxing can be done on either stained or unstained woods. Be sure the stain is dry. Apply wax with a flannel cloth one or more times. Rub to a hard finish with a sheepskin. For some jobs waxing can be substituted for varnishing, lacquering or other finishes.

Lacquers and some of the recently developed products are applied with few strokes of a soft brush or can be sprayed on. They dry rapidly and are tough and durable. Keep the lacquer thin with a lacquer thinner. Allow about an hour between coats for drying. Two or three coats are sufficient. The chart, page 24 indicates the desirable steps commonly recommended in finishing woods of several species. Information is lacking on many of our native woods. They may be compared to woods of similar characteristics in the chart and elsewhere in the bulletin to work out a finishing procedure. All information above and the chart should be considered only as an outline of wood finishing. Further information should be obtained from the U. S. Forest Products Laboratory of Madison, Wisconsin, or other authorities.

Cooperative Extension Work in Agriculture and Home Economics, Agricultural and Mechanical College of Texas and United States Department of Agriculture Cooperating.
Distributed in furtherance of the Acts of Congress May 8 and June 30, 1914.
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